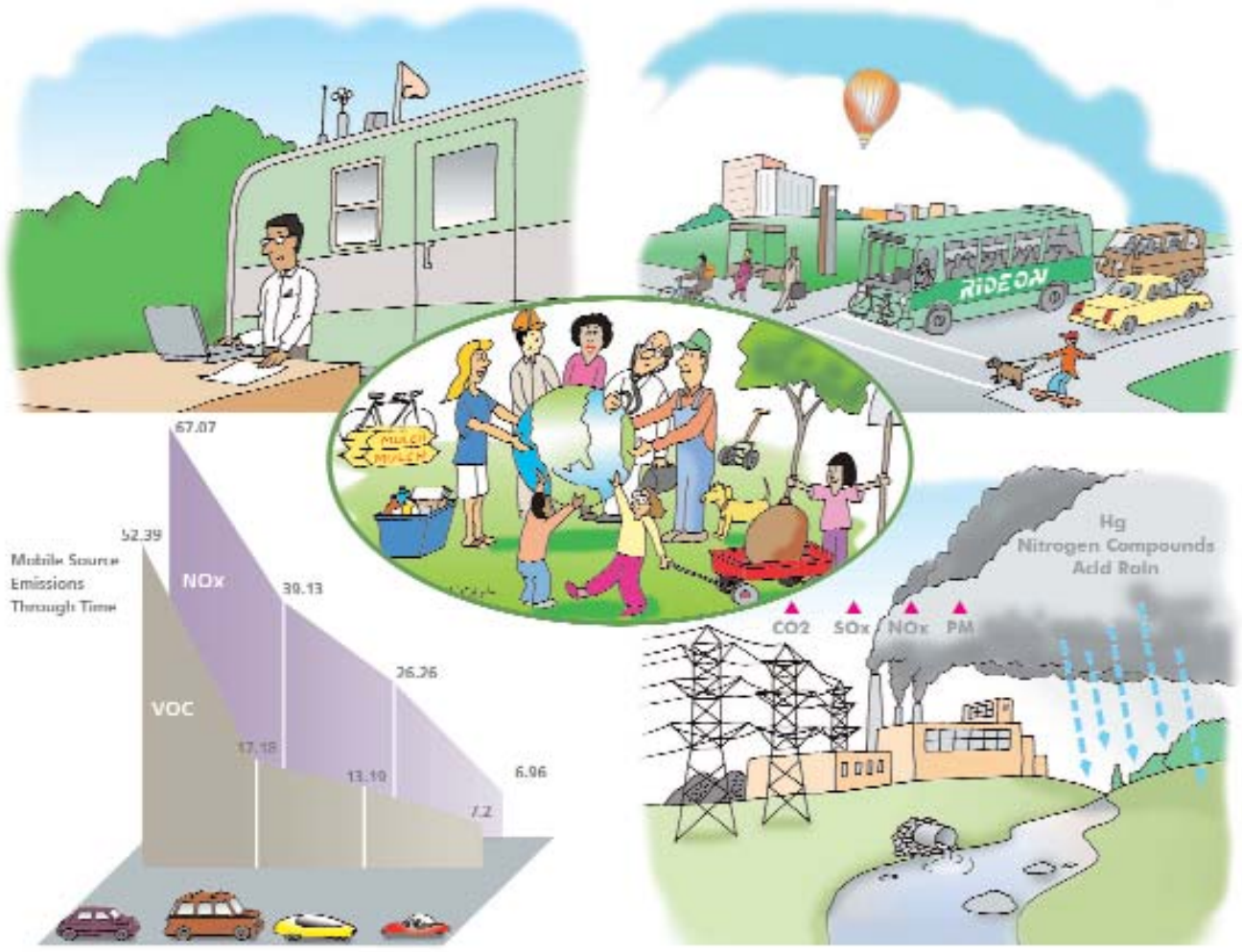
Air Quality Protection Strategy

2003



Air Quality Protection Strategy

2003

Department of Environmental Protection
Montgomery County, Maryland

Table of Contents

From the County Executive

Montgomery County is a nationally recognized leader in its commitment

to environmental quality, and with development of this *Montgomery County Air Quality Protection Strategy*, we have completed blueprints for reducing pollutant levels and preserving our streams, groundwater, forests, and now air. The health of our residents and businesses is jeopardized by air pollution, and the cost of inaction is too great. This *Air Quality Protection Strategy* outlines eight realistic, step-by-step actions that we can take to reduce air pollutants, including harmful levels of ground-level ozone and particulate matter. The *Montgomery County Air Quality Protection Strategy* should help us preserve our quality of life, while serving as a model for other local governments.

Douglas M. Duncan
Montgomery County Executive

From the DEP Director

The guiding principle behind this important new strategy is that protecting and improving air quality is a community effort: no single jurisdiction can make a difference without the cooperation of the entire region. No single government agency can hope to improve air quality without the determined cooperation of residents and businesses, each learning what they can do as part of a whole, working with us — and working together.

James A. Caldwell
Director
Department of Environmental Protection

Introduction

The Need for the Montgomery County Air Quality Protection Strategy

Air, land, and water are basic components of the environment and are vital to our life. You may need only a liter of water per day but try living for a day without 13,000 liters of clean air. We take the quality of air for granted, it's always there with every breath we take sustaining our life. There's no faucet to turn, no effort in breathing. Over the past decades, we have made lifestyle changes and advances in technology that has had a major impact on the quality of our air. Currently, over 800,000 citizens in Montgomery County are living in an air shed that does ***NOT*** meet the National Ambient Air Quality Standards. During recent years there have been as many as 36 summer days, where our citizens are encountering "code red" -and for the first time during the Summer of 2002 "code purple" air quality days for the upcoming 8-hour standard. How many would consider drinking contaminated water that does not meet drinking water standards? New studies are indicating that Maryland residents suffer from 170 deaths and 4,400 asthma attacks per year due to particulate air pollution alone[1]. Millions of dollars are wasted on health care costs, lost worker productivity and crop damage from air pollution. The stratospheric ozone hole continues to concern our scientists, and our climate is getting warmer.

Did you know?

As much as 30% of the nitrogen deposition in the bay is caused by air pollution.

The State of Montgomery County's Air Quality

Untainted air consists of nitrogen, oxygen and a range of other gases. There are emissions from natural sources. However, in urban areas such as the Washington metropolitan region, the human population's activities are generating large quantities of emissions into the atmosphere. These emissions are changing the make-up of the air in the atmosphere and, consequently, the quality of air we breathe. Air quality can be defined as the suitability of air for breathing by people, plants and animals in terms of potential health effects. Air pollution also impacts soil and water quality (via deposition), forest and tree health, visibility, property and affects agricultural productivity.

In terms of human exposure to air pollution, it is hard to define acceptable levels. This is due to the fact that health effects depend on the nature of pollutants present, their concentrations, length of exposure and the individual's current health. People with existing health problems and/or other lifestyle factors (for example, whether a person smokes or not) may not be able to tolerate the same level of pollutants as a healthier person.

In developing an air strategy, it is prudent to take actions which are going to have the greatest impact on improving the quality of air we breathe. It is also important to understand our limitations and the effect that local measures will have on the regional environment. In terms of National Ambient Air Quality Standards, the primary pollutant of concern that directly affects our residents is ground-level ozone. Montgomery County is part of the Washington metropolitan non-attainment area. In fact, this area's classification has worsened from a "serious" to a "severe" non-attainment area. Because, ozone is a serious issue in Montgomery County much of Montgomery County's Air Quality Protection Strategy concentrates on the reduction of ozone's precursor emissions, nitrogen oxides (NOx) and volatile organic compounds (VOCs).

Knowing what Montgomery County's contribution to the region's ozone problem is, and from what sources the emissions are coming, are instrumental in choosing control strategies that will work for this County and thereby improve the quality of air that we breathe. One may not see smokestacks, factories, and chemical plants lining the skyline of Montgomery County, but the population and industries in Montgomery County contribute a substantial quantity of ozone precursor emissions in the Washington Metropolitan Area. Figure I.1 depicts the quantity of ozone

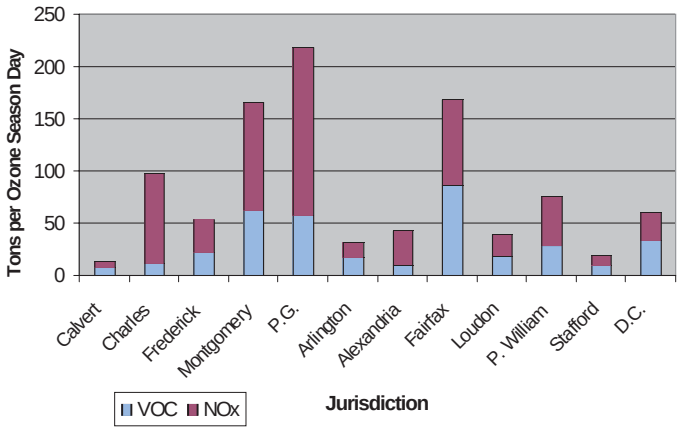


Figure I.1 details the quantity of NOx and VOC emissions in tons per ozone season day that are emitted in each jurisdiction.

precursor emissions in this region's non-attainment area.[2]

Figure I.2 details which sources are responsible for contributing to the NOx and VOC emissions in Montgomery County. The pie charts shown in figure I.2 were generated from data collected in the 1999 Periodic Emissions Inventory (PEI) compiled by the Metropolitan Washington Council of Governments. Point sources are stationary sources that emit more than 10 tons per day of emissions. Area source emissions include small industries, such as bakeries and printers. Non-road sources include construction and farming equipment, commercial and residential lawn and garden activities, and recreational boating. On-road or mobile sources are emissions from transportation sources and are estimated from regional transportation models. As depicted, area sources and mobile sources are the largest contributors to VOC emissions, and point sources and mobile are the largest contributors in Montgomery County for NOx emissions. This type of data gives us a beginning of where to start focusing our efforts in improving the air quality in Montgomery County.

Aside from not meeting the National Ambient Air Quality Standard (NAAQS) for ozone, the County faces additional challenges. As the new NAAQS for fine particulate matter draws near, it appears meeting this standard may also pose difficulty for the region. In addition to ozone and fine particulate matter, air modeling data from the Environmental Protection Agency shows that this region contains levels of several air toxics above the 95th percentile. So, as strategies are developed to reduce ozone precursor emissions, it is also important to integrate reductions in particulate matter, air toxics and other air quality concerns in these strategies.

But as serious as our air quality problems are today, it was not long ago that this area failed to meet the National Ambient Air Quality Standard for carbon monoxide. And, generally speaking, the air quality in this area has improved over the last decade, as shown in a report produced by the Metropolitan Washington Council of Governments- "Air Quality Trends in The Washington Metropolitan Area, 1985-1996". In order to establish a fundamental understanding of air quality, and to provide basic information on air pollutants and their sources, an air quality primer has been developed by the Department of Environmental Protection. This primer includes fact sheets on some of the most prevalent air quality issues facing us today: the national ambient air quality standards, ground-level ozone, particulate matter, stratospheric ozone depletion, global warming, acid rain, and air toxics. This primer is located at **www.AQPrimer.askdep.com**

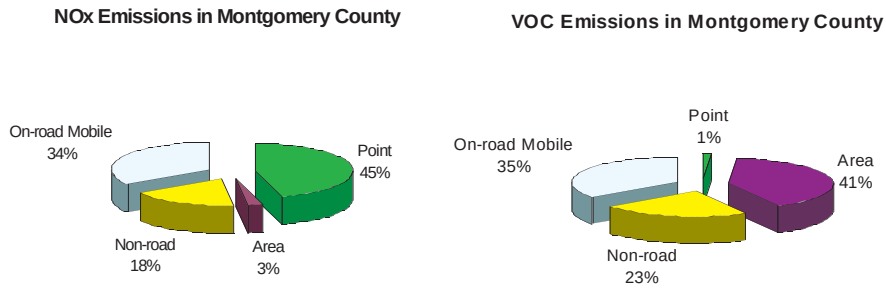


Figure I.2 details the contribution of the various sources to emissions of ozone precursors in Montgomery County.

Purpose and Scope of this Strategy

The Montgomery County Air Quality Protection Strategy aims to give all residents healthy air, making Montgomery County a leader in air quality protection and thus setting an example for other local and state jurisdictions to follow. It is especially important in the ambient air quality arena to reach out and become good stewards of our air shed since not only do our actions affect the air quality of those downwind of us but others actions, or lack there of, affect the quality of air that we breathe locally. In developing Montgomery County's Air Quality Protection Strategy, an examination of some of the major air quality issues and which air pollutants are of most concern to our area were evaluated. Based on each of the issues discussed and the pollutants of concern, eight (8) strategies were chosen based on their ability to positively impact our air quality, both locally and globally.

While research has shown that indoor air quality is strongly influenced by outdoor or ambient air quality, the sources and range of indoor air pollutants are somewhat distinct from those affecting local and regional air quality and has not been included in this document.

Goals of the Montgomery County Air Quality Strategy

The goals for Montgomery County's Air Quality Strategy are influenced by our desire to protect public health and the environment. This Air Quality Protection Strategy describes the primary goals to assess and reduce the impacts of air pollution on our children, our communities, and our County. These goals include:

- Development of new strategies to effectively reduce air pollution while being cognizant of the multi-media (air, land, water) effects of air pollutants.
- Commitment to community education and outreach, thus leading to awareness and changes resulting in fewer emissions.
- Integration of strategies to reduce ozone, particulate matter, and toxic air pollutants, as well as cutting Montgomery County's contribution to global climate change.
- Measurement and assessment of progress in cleaning up our airshed.
- Encouragement for other local jurisdictions to utilize this strategy as a blueprint for reducing air pollutant emissions regionally.

Montgomery County Air Quality Strategies and Priorities

This strategy will coordinate air quality actions and incorporate significant changes in thinking within the field of air quality management. For example, strategies must balance consideration of regional impacts with local population exposure considerations. The Montgomery County Air Quality Protection Strategy focuses on addressing local and regional air pollution issues. This strategy has taken a holistic approach when evaluating pollutant reduction strategies. For example, when designing pollution prevention reductions for industries, not only are ozone precursor reduction strategies looked at but also, air toxics, greenhouse gases, and stratospheric ozone depleting substances. Additionally, care was taken not to exchange one pollutant problem for another.

After consideration, the eight recommended strategies were developed, see figure I.3.

Each strategy details the program and proposes a small number of significant new action areas along with progress measures. These strategies map out a range of actions that will help advance the strategies' goals. Figure I.4 summarizes the proposed Montgomery County Air Quality Protection Strategy actions. The actions are divided into three tiers, or priority action groups. The priorities were based on each action's ability to affect a positive air quality benefit. A biennial review will be conducted and progress measures will be reported on those strategies and actions that are adopted. Of course, the major indicator will be the number of days the region experiences non-compliant days with a National Ambient Air Quality Standard.

Recommended Strategies:

Strategy 1. Develop an Effective Air Quality Monitoring Network- enables us to better ascertain the actual quality of air we breathe and the variations within the County.

Strategy 2. Reduce Emissions from Area Sources-further development of Department of Environmental Protection's Environmental Partners Program will decrease area source emissions in the County through voluntary actions.

Strategy 3. Reduce Emissions from Point Sources-NOx emissions in the County and ozone transport are largely due to point sources. The County will endeavor to support necessary controls on power plants through partnerships and support of legislative action.

Strategy 4. Reduce Emissions from the County's Fleet and Operations-mobile and non-road emissions contribute a significant percentage of emissions in Montgomery County and Montgomery County's public agencies must set an example by decreasing emissions in these categories.

Strategy 5. Reduce Emissions from Mobile Sources -encouragement of decreasing vehicle emissions by promoting activities such as transit use, carpooling, teleworking and telecommuting.

Strategy 6. Reduce Greenhouse Gas Emissions-further development and implementation of the County's Cities for Climate Protection program will decrease greenhouse gas emissions.

Strategy 7. Increase Tree Canopy and Forest Cover- implementation of the County's Forest Preservation Strategy will decrease air pollutants.

Strategy 8. Reduce Emissions from Public Activities-outreach campaigns are necessary to decrease emissions and promote behavioral changes of the general public.

Figure I.3

Figure I.4

Action Number	Tier 1 Priority Action Description
2.2	Addition of Industry to Environmental Partners Program
3.1	Partner with power plant industry to reduce emissions.
4.2	Implement Particulate Matter Emission Reduction plan for School buses.
4.3	Implement "Technology Neutral" Emission Reduction Plan for Ride-On buses
8.1	Conduct annual outreach programs to encourage behavior change in public activities

Action Number	Tier 2 Priority Action Description
1.1 & 2.1	Initiate contract to develop an air quality emissions database
1.2 & 1.3	Determine appropriate density, site, purchase, and monitor additional air monitoring stations
2.3	Hold semi-annual pollution prevention workshops for the Environmental Partners Program
3.3	Purchase 5% of electric generation from zero emission power sources
3.4	Institute an Energywise Office Program
4.1	Adhere to vehicle replacement schedules
4.4	Purchase up to 20% of passenger replacement vehicles with hybrid, flex fueled or other clean technology vehicles
4.6	Develop an "Emission Reduction Pledge" and encourage Municipalities to adopt
4.7	Place retro-fit and idling requirements in County construction contracts
5.3	Carpool/vanpool preferential parking passes, guaranteed ride home, and parking cashout
5.5	Lobby for increase in MARC train service
5.9	Develop recognition Program for achieving greatest percentage reduction of single occupant vehicle mileage
6.1	Adopt reduction of greenhouse gases of 20%-"Milestone 2"
6.2	Develop Cities for Climate Protection Action Plan-"Milestones 3 & 4"
7.3	Calculate and track changes in reductions of air pollutants in areas meeting tree canopy goals
7.4	Calculate and track changes in energy and cost savings per acre in areas meeting tree canopy goals
8.2	Formulate outreach materials for energy conservation and residential green power purchasing
8.3	Provide outreach materials for mass transit, fareshare, carpooling, and telework/telecommuting
8.5	Develop air pollution lesson plan material for elementary schools

Action Number	Tier 3 Priority Action Description
1.4	Post air monitoring data on variable message traffic signs
3.2	Support Multi-pollutant legislation
3.5	Incorporate "Green Buildings" technologies in County building construction
4.5	Conduct Annual Fleet Inventory and Emissions
5.1	Acquire Telework Center Contracts
5.2	Adopt official telework/telecommute and compressed work week policy
5.4	Promote county employee Metrorail passes and increase transit fare subsidy
5.6 &5.7	Increase Ride-On bus service and hiker/biker trails
5.8	Prioritization of "Go Montgomery" projects and sliding scale for vehicle registration fees
7.1	Determine areas of County meeting urban and suburban tree canopy goals
7.2	Develop tracking mechanism to monitor changes in tree canopy coverage
7.5	Plant street trees to replace dead or damaged ones removed each year
7.6	Increase the number of acres upland and riparian forests protected
8.4	Continue Ozone Action Day Plan and consider additional actions

[1]Particulate-Related Health Impacts of Eight Electric Utility Systems, Abt Associates, Inc., April 2002

[2]1999 Periodic Emissions Inventory of Ozone Precursor Emissions, prepared by Metropolitan Washington Council of Governments.

Strategy 1: Develop an Effective Monitoring Network

Rarely can we see air pollution. Therefore it is necessary to monitor both the concentrations of pollutants emitted into an air shed and in the air we breathe in order to gauge the potential impact on human health. Evaluating air quality involves two types of assessments, emission inventories and ambient air quality monitoring. Emission inventories measure the amount of pollutants being released into the air shed from various sources, for example, motor vehicles, industry and domestic activities. Once pollutants are released into the atmosphere, prevailing winds and other meteorological factors play a key role in determining how pollutants react with one another to form secondary pollutants (such as photochemical smog), how far they are transported, and where they are eventually deposited. It is necessary to conduct ambient air quality monitoring by measuring ground level concentrations of pollutants to gain a better understanding of how emissions impact ambient air quality and the air we breathe.

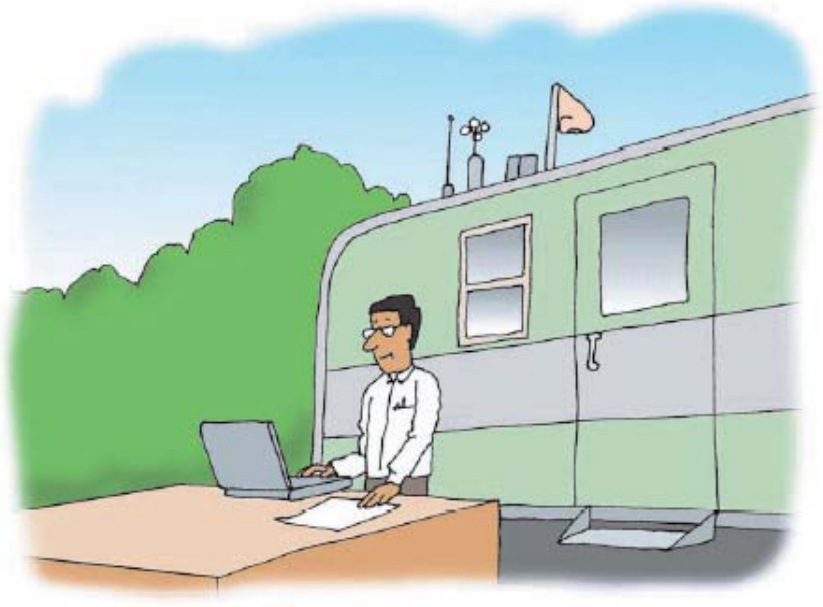
There are two types of emission inventories conducted:

- Industrial emission inventories are conducted by the State of Maryland Department of the Environment. A printout of these results is given to Montgomery County Department of Environmental Protection.
- Mobile emission inventories are conducted by Washington Metropolitan Council of Governments as part of the region's State Implementation Plan for non-attainment for ozone.

In order to determine the condition of the air quality in Montgomery County, what pollutants are present, and the level of those pollutants present in the air we breathe, an effective monitoring network is necessary. The State is responsible for measuring air quality throughout the state and does so through the operation of a network of monitoring stations called state and local air monitoring stations (SLAMS). Maryland currently operates 33 monitoring sites. These monitoring sites are located across the state. Together these sites measure the six criteria pollutants for comparison with the National Ambient Air Quality Standards (NAAQS). Additionally, photochemical assessment monitoring and air toxics monitoring is conducted at some of the sites. Photochemical assessment monitoring sites (PAMS) provide enhanced monitoring for ozone and its precursors. Of the 33 monitoring sites, only one is located in Montgomery County, in Rockville. This station monitors ozone, $PM_{2.5}$, and meteorological parameters.[1] Currently, no air toxic monitoring is performed in Montgomery County even though EPA modeling predicts that there are levels in the 95th percentile of several air toxics such as perchloroethylene, mercury, and diesel particulate matter.

Additionally, in the wake of the September 11 terrorist actions, Montgomery County's Emergency Management Group (EMG) in Montgomery County is seeking funding to equip a monitoring network with the ability to detect chemical and biological pollutants in the event of a release.

Currently, real-time ozone data is provided to the public through the Department of Environmental Protection's website: **www.askdep.com.** Real-time data can be very helpful both as an outreach tool and an assessment tool. If an affected segment of the population is sensitive to a specific pollutant, they can ascertain the necessary information and take the appropriate precautions. Real-time data can also serve as an outreach tool, reaching large numbers of the population. In order to fully utilize the monitors some areas are posting real-time air quality data on traffic signage.



(For more information about Air Toxics and the NAAQS, see the Montgomery County Department of Environmental Protection's Air Quality Primer on our website **www.AQPrimer.askdep.com***)*

Proposed Actions:

1.1 Initiate a contract to complete the development of an air quality emissions database, the purpose of which is to collect and analyze emissions inventory data for Montgomery County's industries. This database should contain all the sites in Montgomery County that are required to obtain an environmental permit and have the ability to perform GIS mapping.

1.2 Work with the Maryland Department of the Environment or initiate a contract to determine the ideal density of monitors with the realization of Montgomery County's monitoring objectives and budget constraints. This involves the siting, purchasing, identification of the pollutants to be measured, and necessary staffing increases for additional monitoring stations in Montgomery County. While the Code of Federal Regulations, 40 CFR Chapter 1-Part 58, describes a minimum of six basic objectives to be met when designing a monitoring network, there are no requirements in determining an adequate amount of monitoring stations. The optimum size of a particular network involves trade offs among data needs and avail able resources.

1.3 In keeping with the National Ambient Air Monitoring Strategy[2], work with the Maryland Department of the Environment or a contractor to ensure that the monitoring network will:

- Accelerate real-time reporting of air quality information to the public as an important cornerstone.
- Target pollutants of concern for Montgomery County including the determination of any environmental justice issues.
- Address trends in air quality, assess effectiveness of control strategies.
- Assist in determination of multi-media-air, water, and soil impacts of pollution and in defining the most cost-effective management controls for reducing multi-media impacts.

1.4 Work with Montgomery County Department of Public Works and Transportation and the State Highway Administration to post data on variable message traffic signs.

Proposed Progress Measures:

1.1 The number of new monitoring networks installed and operated in Montgomery County.

1.2 The number of pollutants being measured at the monitoring networks.

1.3 The frequency and outreach media used to report air pollution levels to the public.

1.4 Development of the air emissions database.

1.5 Identification of environmental justice issues utilizing the Air Database.

[1]Maryland Department of the Environment website, **www.mde.state.md.us**

[2]The Environmental Protection Agency's website, **www.epa.gov**

Strategy 2: Reduce Emissions from Area Sources "The Environmental Partners Program"

Reducing ozone precursor emissions is critical if the Washington Metropolitan area is to reach attainment for the National Ambient Air Quality Standard for ozone. Ground-level ozone is formed when intense sunlight reacts with Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs). Area sources are responsible for up to 41 percent of the VOCs emitted in Montgomery County.[1] Therefore, it is imperative that Montgomery County be able to identify "priority industries" which contribute a significant proportion of the ozone precursor emissions in this region and work with them to reduce this impact. Industries such as service stations, paint manufacturers, and bakeries are examples of area sources that contribute significant amounts of VOCs. The Maryland Department of the Environment (MDE) issues permits to many of these industries. At the present, there are more than 2,000 sites in Montgomery County that are required to obtain an Air Permit from MDE.

In Montgomery County, the Department of Environmental Protection's (DEP) primary mechanism for reducing industrial emissions of VOCs and NOx is the DEP's Environmental Partners Program. The Environmental Partners program is a dynamic new cooperative pollution prevention program between DEP and businesses in Montgomery County. The goal of the program is to introduce industry to specific pollution prevention techniques which not only reduce the amount of ozone precursors emitted, but also evaluates reduction opportunities for other pollutants of concern. Ultimately these reductions will save the industry money, time, labor and resources. This program is designed to get to the root causes for on-site pollution through training and resources. Extensive research, in-house training, and a ready made package of current, cost effective pollution prevention measures are presented on a one to one level at the site. The materials, in the form of fact sheets and other supportive materials are made available as a workbook in hardcopy format for the industry.

DEP has developed this program for the vehicle maintenance and repair industry. This industry was chosen because of the wide use of solvents in vehicle maintenance and repair. To date, over 25 facilities have signed up to become Environmental Partners. Environmental Partners are required to meet all environmental regulations and permitting requirements, and pledge to initiate pollution prevention actions to reduce emissions of pollutants to the air and water. A list of all facilities meeting these requirements is maintained on the Department of Environmental Protection's website, **www.askdep.com**, and will be published periodically. Citizens are encouraged to support these facilities for their environmental efforts. One of the most successful stories with the Environmental Partners is with an automotive repair chain that operates throughout the Mid-Atlantic. This chain has pledged to remove the solvent machines from all of the 110 stores in operation in the mid-atlantic. This results in a reduction of over 36 tons per year of VOCs! These reductions not only benefit local air quality but regional air quality as well.

(For more information on Ozone see the Montgomery County Department of Environmental Protection's Air Quality Primer located on our website at **www.AQPrimer.askdep.com**)

Proposed Actions:

2.1 In line with Proposed Action 1.1, develop an air quality emissions database, which will contain all of the sites in Montgomery County that are required to obtain an environmental permit with applicable Geographic Information System (GIS) information. This will allow mapping of the locations of significant emitters, investigate odor concerns, and determine "hot spots" or areas where a significant number of emitters of a particular pollutant are located. Each site should have permitting information, including air emissions data obtained from the Maryland Department of the Environment. This data can then be utilized to identify which industries in Montgomery County are generating significant ozone precursor emissions and other pollutants of concern. This information can then be used to most effectively reduce emissions in Montgomery County.

2.2 Once, an industry is identified as a priority industry, develop an industry specific pollution prevention manual in a ready made package to be included in the Environmental Partners program.

2.3 Host semi-annual pollution prevention workshops for priority industries. These workshops should highlight pollution prevention successes from that industry.

Proposed Progress Measures:

2.1 Amount of VOCs reduced through the Environmental Partners effort.

2.2 Amount of NOx reduced through the Environmental Partners effort.

2.3 Amount of Green House Gases reduced through the Environmental Partners effort.

2.4 Amount of stratospheric ozone depleting substances reduced through the Environmental Partners effort.

2.5 Amount of Air Toxics reduced through the Environmental Partners effort.

2.6 Percentage of businesses/industries participating.

2.7 Establishment of training protocols and assignment of DEP personnel to work with businesses and industries.

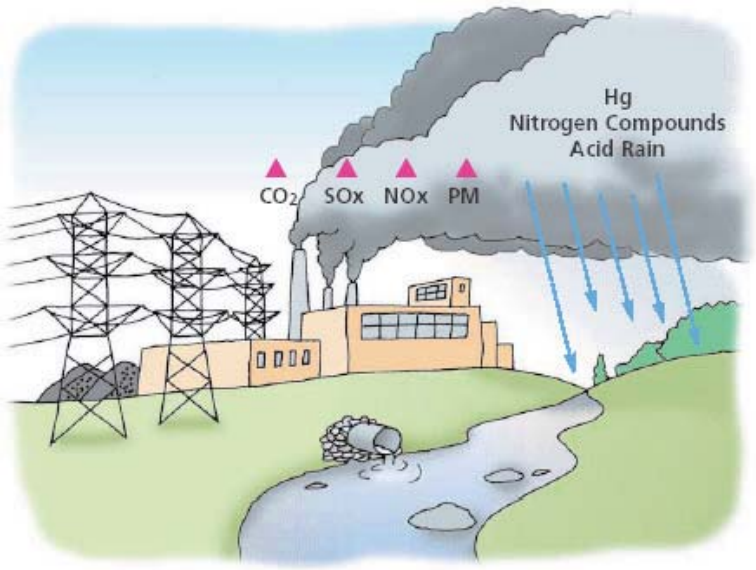
[1] 1999 Periodic Emissions Inventory of Ozone Precursor Emissions, prepared by Metropolitan Washington Council of Governments.

Strategy 3: Reduce Emissions from Point Sources "Power Plant Emissions"

One of the priorities of the Air Strategy is to reach attainment with the National Ambient Air Quality Standard (NAAQS) for ozone. The point source category is responsible for the greatest percentage of NOx emissions in Montgomery County, accounting for 45 percent of all NOx emissions. Further, 93 percent of the point source NOx emissions is attributable to fossil-fueled power generation in Montgomery County.[1] If point sources are to be addressed, our efforts must be focused on reducing power plant emissions and their impacts.

When it comes to environmental consequences, emissions from power plants do not discriminate on the basis of media-be it air or water, or pollutants of concern-whether its nitrogen oxides (NOx), sulfur oxides (SOx), mercury, or particulates. Power plants, especially coal-fired plants, play a large role in a multitude of environmental consequences. The myriad of pollutants and their effects include:

- **Nitrogen Oxides.** Emissions of the ozone precursor, NOx.
- **Mercury.** Emissions of the air toxic, mercury. One form of mercury, methyl mercury is volatile and very water soluble. Mercury in the atmosphere primarily comes from coal-fired utility and incinerator emissions that may enter the watershed through run-off and atmospheric deposition.[2]
- **Sulfur Dioxide.** Emissions of a major acid rain ingredient, sulfur oxides (SOx). Sulfur dioxide (SO_2) and nitrogen oxides are the primary causes of acid rain. In the United States about 66% of all SO_2 and 25 percent of all NOx comes from fossil-fueled power plants.[3]
- **Greenhouse Gases.** Emissions of the greenhouse gas, Carbon dioxide (CO_2). CO_2 is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), and wood are burned. [3]
- **Particulates.** Emissions of particulates. Particulates are directly emitted into the air by sources such as factories, power plants, transportation sources, construction activity, fires, and windblown dust.[3]



In recognizing the dramatic effect that old fossil-fueled power plants have on our air quality and health, a concerted approach must be taken to improve air emissions from these plants while recognizing the benefits of having a diverse fuel source. The technical capability is now available to reduce the NOx emissions on power plants by over 90 percent through the use of a selective catalytic reduction system (SCR). In fact, Montgomery County's Resource Recovery Facility installed another technologically advanced system, a selective non-catalytic reduction (SNCR) system, to control its emissions. One source of complexity for both electric utilities and regulators is the New Source Review (NSR) program. The New Source Review program is a program enacted under the 1990 Clean Air Act that requires new sources of air pollution, or sources that make major modifications to their plants, to install pollution control equipment. Controversy has centered around what constitutes a major modification, and as such many plants have made changes to their plants without installing pollution control equipment, claiming that the changes were not major. At the same time, other plants have avoided making modifications so that they would not be required to install pollution control equipment. New legislation has been proposed which exempts all maintenance, repair, or replacement modifications up to average annual maintenance cost. These changes could even prevent more stringent state or local programs. In order for this area to come into compliance with the National Ambient Air Quality Standards, effective and advanced pollutant control system

technologies must be installed, not only in Montgomery County, but on all power plants, as the regional transport of NOx contributes significantly to our ozone problem. Therefore, it is essential that effective federal legislation regarding the NSR program be implemented, where changes are required for all plants. This ensures that reductions will be made and that every plant will have to pay for these advanced systems, thereby leveling the playing field. From a public policy and public health perspective, use of a superior technology is a reasonable allocation of resources. The Environmental Protection Agency (EPA) analyses show that reducing one ton of NOx from electric utility plants costs about $1500, significantly less per ton than implementing local controls, which have reached as high as $9,500 per ton. Further, EPA calculates that the costs of reducing utility emissions could cause residential electric rates to increase less than two percent.[3]

Proposed Actions:

3.1 Partner with the power plant industry to formulate creative solutions to reduce emissions from power plants.

3.2 Support multi-pollutant legislation, where reductions are required for all plants at both the federal and state levels.

3.3 In accordance with Proposed Action 5.3, purchase five percent zero emission power, such as wind, from generation sources within sufficient geographic proximity to provide a local air quality benefit. Citizens should also be encouraged to purchase clean energy where available.

3.4 Incorporate and encourage energy conservation programs to reduce electricity demand and pollution through an Energywise Office Program.

3.5 Investigate incorporating "green building technologies" in all new county buildings at LEED silver or better that includes reduced electricity demand and associated air pollution.

Proposed Progress Measures:

3.1 The amount of pollutant reductions achieved at power plants located in Montgomery County.

3.2 The number of coal-fired plants within the non-attainment area that agree to install advanced control technologies to reduce NOx.

3.3 Amount of zero emission energy purchased by Montgomery County.

3.4 Energy savings from the Energywise Office program.

3.5 Number of buildings in Montgomery County incorporating green building design principles.

[1]The 1999 Periodic Emission Inventory, The Washington Metropolitan Council of Governments.

[2]The Maryland Department of Environment's website, **www.mde.state.md.us**

[3]The Environmental Protection Agency's website, **www.epa.gov**

Strategy 4: Reduce Emissions from County Fleet and Operations

In evaluating means to reduce air pollution in Montgomery County on-road mobile emissions must be addressed. On-road mobile emissions account for 34.3 percent of the nitrogen oxide (NOx) and 35.1 percent of the volatile organic compounds (VOC), ozone precursors, emitted in the County[1]. Heavy-duty diesel engines, trucks and buses, release unburned hydrocarbons (HC) (for transportation purposes, HC are non-methane organic compounds measured as a subset of VOCs), carbon monoxide (CO), sulfur oxides (SOx), NOx, particulate matter (PM), and other toxic compounds that contribute to acid rain, ground-level ozone, and reduced visibility. Heavy-duty trucks and buses account for about 27 percent of NOx emissions from all cars and trucks, even though they only comprise 3.7 percent of the total number of vehicles on the road in the County.[2]

Another significant source of ozone precursors are emissions from the non-road category. Emissions from sources in this category account for 23 percent of VOCs and 18 percent of NOx emitted in the County. Non-road sources include construction and farming equipment, commercial and residential lawn and gardening activities, and recreational boating. Montgomery County government must lead by example, thus this strategy aims to reduce emissions from the County fleet and its operations. Montgomery County's on-road mobile fleet consists of 337 Ride-On buses, 1,167 school buses, 1,940 passenger vehicles (includes vans, SUVs, and light pick-up trucks), and 678 pieces of heavy duty equipment. This strategy addresses emission reduction actions in these categories. As part of Montgomery County's leadership efforts, the County will encourage other governmental municipalities and agencies located in Montgomery County to reduce their fleet emissions.

Changing Rules for Trucks and Buses

In the year 2000, the Environmental Protection Agency (EPA) issued new rules for newly manufactured trucks and buses. These rules will require more stringent emissions standards beginning with the 2004 model year. Even more stringent standards are established for model year 2007 vehicles. The new emissions standards established in these rules will result in PM and NOx emission levels that are 90 and 95 percent below today's levels, respectively. EPA estimates this program will provide annual emission reductions equivalent to removing about 13 million of today's trucks and buses.

However, we will not begin to reap these benefits until 2007 and then only gradually as our fleet ages and begins to be replaced by these air quality positive vehicles. Many regions, including Metropolitan Washington, that are not meeting the National Ambient Air Quality Standard for ozone can not afford to wait for these emission benefits. In these areas the benefits are needed much sooner. Therefore, public transit operations are being asked to take significant steps toward achieving emission reductions from their transit fleets prior to the initiation of the new federal standards.

The Bus Technologies

There are several technologies available for fleet operators to consider to reduce emissions. Some of these technologies are:

- Diesel Retrofit- consists of placing a catalyst trap on current buses. Ultra low sulfur diesel fuel must be used with many of these traps. Significant reductions in PM, HC, and CO emissions are achieved.
- Hybrid Electric- combines an electric propulsion system with an internal combustion engine. These vehicles reduce mobile emissions and improve gas mileage. New York City in conjunction with the Department of Energy tested a series of hybrid buses.[4]
- Compressed Natural Gas (CNG)- Most CNG buses minimize NOx emissions without the need for a NOx after treatment device.
- Hydrogen Fuel Cell- a device that separates hydrogen electrons with a catalyst to produce electricity. The hydrogen combines with oxygen from the air to produce only water and heat as by products. When fuelled with pure hydrogen, a fuel cell emits ***NO*** pollutants and ***NO*** greenhouse gases.

The Ride-On Bus Fleet

Montgomery County's Ride-On bus fleet consists of 337 buses. Some of these buses are pre-1991 and several are pre-1993 model years. Figure 4.1 shows a comparison between the current CNG transit bus technology as well as standards for the diesel transit bus, and the

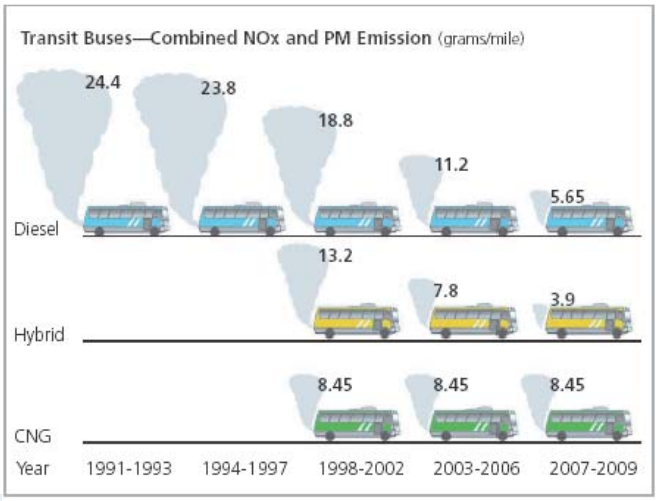


Figure 4.1 details a comparison of emission rates between various transit bus technologies. The data was collected from a chart prepared by Edwards and Kelcey, a Maryland Department of Transportation consulting firm. Vapor images are scaled.

diesel hybrid transit bus. The CNG emissions are expected emissions for comparison purposes. It should be noted that CNG technology may introduce new controls post 2007 that would also reduce the CNG transit bus emissions. These emissions are for comparison purposes only. The hybrid emission standards are based on the expectation that the bus typically achieves a 20-40 percent emission reduction over conventional diesel buses. This reduction is dependent on the bus route. For example, in more urban settings where there is a lot of stop and go, more regenerative braking occurs and thus the bus is powered by the battery more and emission reductions are closer to 40 percent over conventional diesel. From the chart one can see as new technologies emerge and stricter standards take effect, NOx and PM emissions become greatly reduced as fleet replacement occurs.

While evaluating strategies, it was realized that CNG is an important piece of the puzzle in reducing bus emissions. However, Montgomery County recognizes that CNG is only an initial step as there are many technologies on the horizon that are proving to provide great benefits especially the hydrogen fuel cell. With this in mind, it is recommended that the County adopt a "technology neutral" plan.

Montgomery County must continue to strive to reduce its emissions, while not investing too heavily in one technology, therefore, it is recommended an adopted "technology neutral" plan include provisions for:

1. Adherence to a 12 year replacement schedule-the newer model year buses are much cleaner; and
2. Emission reductions of NOx and PM of 25% by the year 2005 and 50 percent by the year 2010.

The School Bus Fleet

Montgomery County's school bus fleet consists of 1,167 diesel buses of which 737 are model year 1989-1998. In addition to the air quality concerns, regarding ozone, new studies have found that the particulate matter from the diesel school buses may expose children to airborne particulate matter concentrations in tested buses 5-15 times higher than background levels.[5] Diesel exhaust contains tiny particles known as fine particulate matter.[6] This study also evaluated the impact of idling buses. Idling buses tested had higher PM and carbon monoxide concentrations than moving buses.

The emissions from school buses do differ slightly from transit buses, as detailed in figure 4.2.

Did you know?

Children breathe 50% more air per pound of body weight than adults

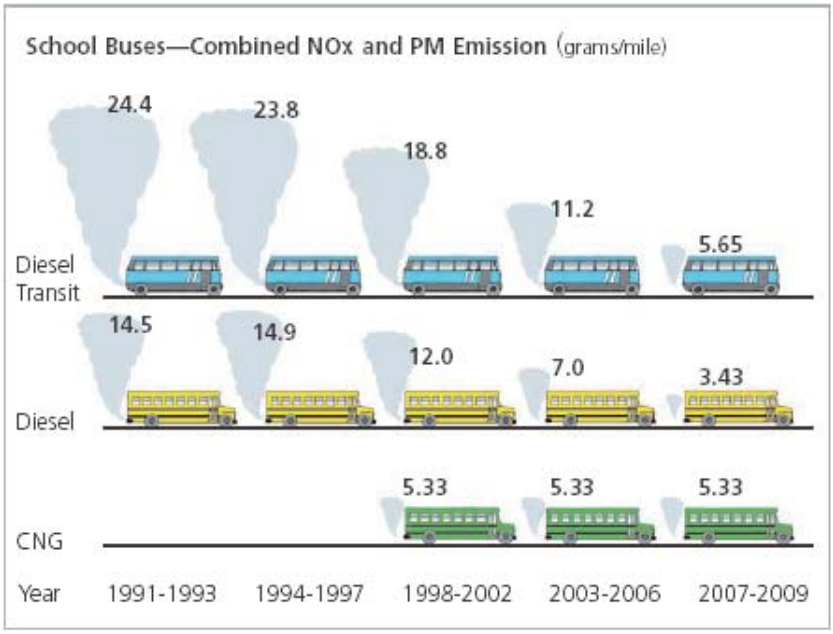


Figure 4.2 details the comparison in emissions of the diesel transit, the diesel school, and the CNG school buses. Emission estimates were provided by Edwards and Kelcey consulting firm for comparison purposes only not calculations.

An emission reduction plan for Montgomery County's school bus fleet should be adopted and include:

1. Adherence to a 12 year replacement cycle as required by the Annotated Code of Maryland subsection 7-804(a).
2. Implementation of a retrofit program to reduce diesel particulate emissions by 25 percent by 2005; and
3. Adoption of a policy regarding school bus idling.

Priority should be given to reducing particulate matter in the school bus fleet as studies are indicating the adverse impacts of particulate matter.[6]

The Passenger (Light-duty) Vehicle Fleet

Montgomery County has 1,940 passenger vehicles in its fleet. Many alternative fuels and technologies are also available for passenger vehicles. For example, recently, Montgomery County's Department of Environmental Protection purchased two Toyota Prius hybrid vehicles. By replacing older

vehicles, and adding hybrid technology to its fleet, the Department of Environmental Protection was able to cut its ozone precursor emissions from its fleet by 15 percent! The Department offset the incremental cost of the hybrids by downsizing.

The following passenger vehicle fleet actions are recommended:

1. Replacement schedules should be adhered to. The current policy is to replace the vehicles after 8 years or 80,000 miles.
2. County Department fleets should be evaluated. Where practical, larger vehicles should be downsized to hybrid sedans.
3. Set a requirement that at least 20 percent of the County's light-duty or passenger vehicles that are replaced annually are replaced with hybrid-electric vehicles, flex-fueled, or other clean technology vehicles.

Non-road contracts

Many retrofit and alternative fuel technologies exist for construction equipment, which are part of the non-road category. A successful example of a government construction contract that included environmental controls is the "Big Dig" project. The "Big Dig" project is a highway tunnel construction project in Boston where the bid specified that contractors were to minimize diesel pollution by retrofitting large non-road diesel construction equipment with oxidation catalysts and requiring that trucks and equipment not idle for more than five minutes. These practices are estimated to have reduced emissions of pollutants by more than 203 tons over a six year period.[7,8]

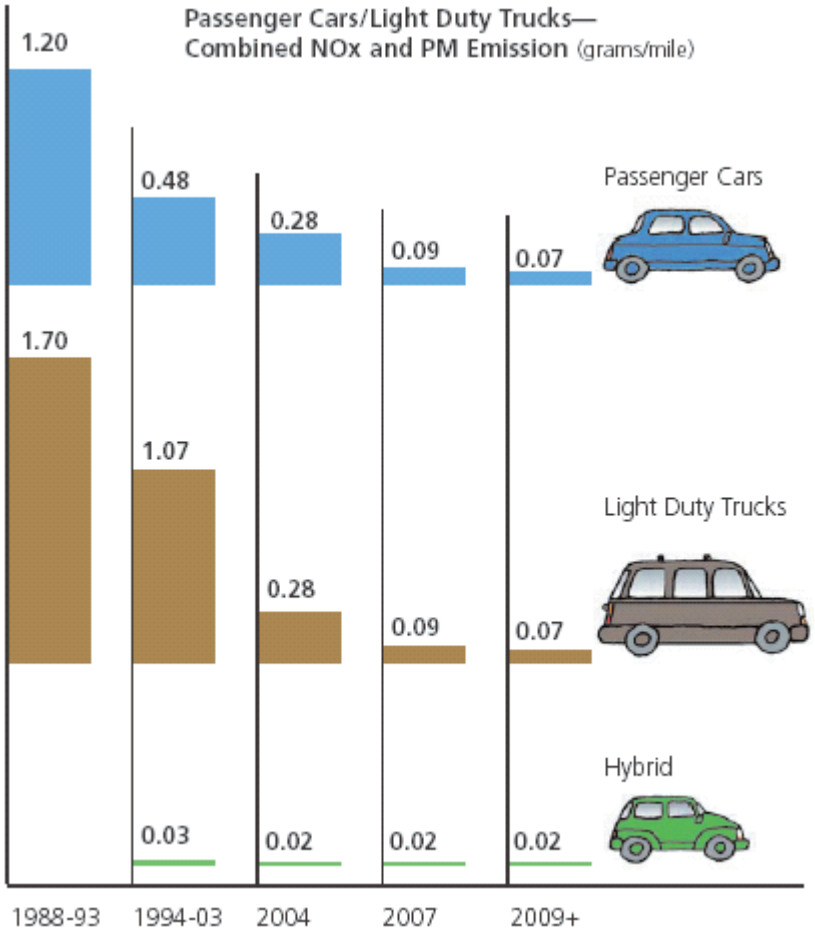


Figure 4.3 details the comparison in emissions of the passenger car, the light duty vehicle, and hybrid cars.
Notes: For years 1988 and 1994, emission standard ranges were averaged; for the years 2004+, PM rates are essentially zero; and for the years 2004 and beyond, emission standards are on a fleet average basis for each manufacturer. Emissions data were provided by Edwards and Kelcey consulting firm for comparison purposes only.

Proposed Actions:

4.1 Maintain replacement schedules for Ride-On Buses, School Buses, and passenger vehicles. Replacement schedules for Ride-On and School Buses should meet a 12 year cycle, and passenger vehicles should meet an 8 year, 80,000 mile replacement cycle.

4.2 Implement a plan to reduce PM from school buses by 25 percent by the year 2005. Retrofits and a school bus idling policy should be an integral part of PM reduction in the school bus fleet. This includes the purchase and use of ultra-low sulfur diesel.

4.3 Implement a "technology neutral" plan for the County's Ride-on bus fleet to reduce NOx and PM emissions by 25 percent by the year 2005 and 50 percent by the year 2010. Purchase of hybrid Ride-On buses should be considered as a part of this plan.

4.4 Set a requirement that at least 20 percent of the County's passenger vehicles replaced annually are replaced with hybrid-electric vehicles, flex-fueled or other clean technology vehicles. Police and other public safety vehicles will be exempt.

4.5 Provide annual fleet emissions by Department and a plan to implement vehicle purchases to decrease emissions. An annual scorecard will be provided and the Department with the greatest fleet emission reduction shall be recognized.

4.6 Encourage all of the municipalities located in Montgomery County to sign an emission reduction pledge. (A sample pledge is provided in Appendix A)

4.7 Add retrofit requirements and idling restriction language to County issued construction contracts.

Proposed Progress Measures:

4.1 Percent reduction in NOx emissions from the Ride-On fleet.

4.2 Percent reduction in PM emissions from the Ride-On fleet.

4.3 Percent reduction in PM emissions from the School bus fleet.

4.4 Number of alternate fueled or hybrid electric Ride-On buses and school buses purchased.

4.5 Percent reduction in ozone precursor emissions for the County's passenger vehicle fleet.

4.6 Percent reduction in ozone precursor emissions in those municipalities and other governmental agencies that sign the Fleet Emission Reduction Pledge.

[1]1999 Periodic Emissions Inventory of Ozone Precursor Emissions, Metropolitan Washington Council of Governments.

[2]Mobile 6 model results, the Metropolitan Council of Governments

[3]Washington Metropolitan Area Transit Authority, Biodiesel Fuel Comparison Final Data Report, Donald W. Lyons, National Research Center for Alternative Fuels, Engine and Emissions, West Virginia University, 2003.

[4]Hybrid-Electric Drive Heavy Duty Vehicle Testing Project, Final Emissions Report, Northeast Vehicle Consortium, M.J. Bradley & Associates, Inc., West Virginia University, February 15, 2000.

[5] Environment and Health, Inc., Children's Exposure to Diesel Exhaust on School Buses, February 2002.

[6]Harvard Six City study

[7]The Environmental Protection Agency's website, **www.epa.gov**

[8] **www.Bigdig.com** website.

Strategy 5: Reduce Emissions from Mobile Sources

The 1999 Periodic Emissions Inventory compiled by the Washington Metropolitan Council of Governments reports that on-road mobile emissions account for 35.1 percent of the total volatile organic compounds (VOCs) and 34.3 percent of the total nitrogen oxides (NOx) emitted in Montgomery County. Further, passenger vehicles and light-duty trucks are responsible for 74 percent of the on-road mobile emissions.

Mobile source emissions create a complex and perplexing issue. Our region's growth in population and employment combined with our desire for independent movement is characterized by a continuing increase in vehicle miles traveled (VMT). Recent studies have shown that the VMT have increased 13 percent between 1994 and 2002 while the corresponding population increase was only 9 percent (figure 5.1). As previously stated, today the emissions associated with these VMT account for a large percentage of both VOC and NOx. However, federal emission standards for on-road mobile sources have been tightening for the last few years and will continue to tighten resulting in dramatic emission reductions over the next twenty years. In fact, the Washington Metropolitan Area Council of Governments reports that despite a continued growth projection for VMT, emission levels will continue to decrease and by 2030 the on-road mobile emissions will only be at 12 percent of the 1990 levels (figure 5.2). The challenge that remains is how to lower mobile source emissions while we wait for older vehicles to be replaced with the newer less polluting vehicles.

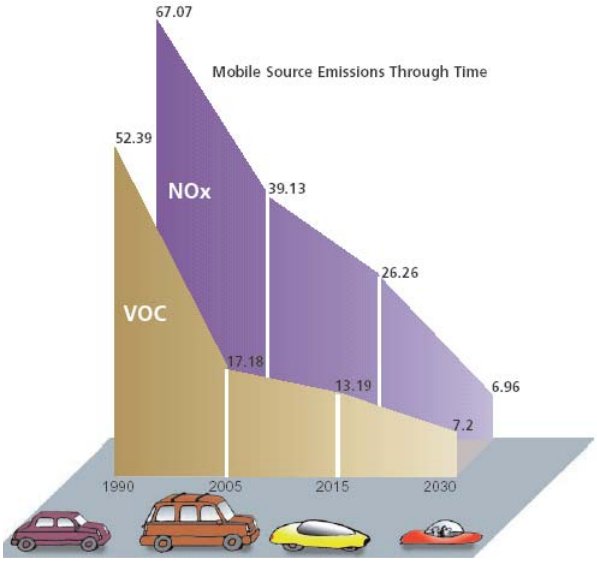


Figure 5.2- projected mobile source emissions through time in Montgomery County. Data is from COG Mobile 6 (2015 & 2030 data is extrapolated.

Adding to the complexity of developing a sound strategy for reducing on-road emissions is the fact that Environmental Protection Agency (EPA) emissions modeling (MOBILE 6) indicate that not only does high vehicle speeds increase NOx emissions, but low vehicle speeds increase both NOx and VOC emissions of today's vehicles on current road systems. This would suggest that congestion mitigation efforts aimed at increasing vehicle speed in areas where speeds are low could be a potential emission reduction measure provided that the project can be accomplished in the near future. However, it is important to note that some measures which increase average speeds in low speed settings may also increase total vehicle trips, cold starts and VMTs at high speeds which are all factors that increase emissions. Thus, in evaluating a congestion mitigation measure, care must be taken to assure any emission reductions achieved by increasing vehicle speeds in low speed settings are not negated by emission increases produced by a greater number of vehicle trips, cold starts and high speed VMTs.

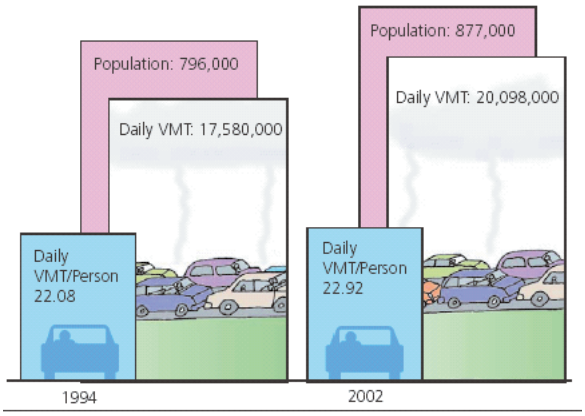


Figure 5.1 details Montgomery County's vehicle miles traveled.

Strategies to reduce mobile emissions are needed in the very near future as they are fundamental to achieve compliance with the Clean Air Act standard for ozone by the year 2005. While immediate road improvements may be of some help to increase speeds and combustion efficiency in vehicles, in order to address our current situation we need to focus a great deal of effort on strategies that address reducing the VMT during both peak (rush-hour) and off-peak periods (less than one-third of all travel occurs during the peak hours).[1]

Where strategy 4 detailed emission reduction strategies to be employed by Montgomery County government's fleet operations, this strategy aims to reduce emissions from all vehicular travel. Reducing car travel is critical for air quality management in Montgomery County and increasing transit use must be a key strategy. Many surveys indicate that transit usage must be convenient and comparable to the length of travel time as the

Strategy 5, continued

single occupant vehicle. Acknowledging this, the Go Montgomery! Program proposes to dedicate bus lanes, install queue jumpers at intersections and purchase an additional 144 new buses to supplement the services currently provided by Ride-On. It is estimated that these enhancements may increase ridership by 75 percent.[2]

Montgomery County Commuter Services has implemented several programs to help residents and employers address emission reductions through reduction in vehicular usage. These programs include: increasing carpooling through car/van pool matching, providing information on telecommuting/teleworking, increasing use of mass transit through the Fare Share/Super Fare Share programs, and the addition of more transportation management districts. Transportation management districts (TMDs) are located in the County's most congested urban areas. TMDs work closely with employers to reduce solo driving by regulating parking, promoting transit, carpools, biking, and other commuting options within the TMD. The Fare Share/Super Fare Share programs offer employers up to $32.50 per month, per employee, in matching funds for public transportation costs to and from work.

Whereas all the previous measures are directed at work trips, the majority of the travel occurs during off-peak hours. For off-peak hour trips, there are other options to consider. County parking facilities fees should be reviewed to provide incentives to carpoolers and disincentives to single occupant vehicles. Optimization of traffic signal timing should be implemented along with bus signal pre-emptors where practicable along major corridors. Additionally, land use planning should encourage high density housing around metro stops along with pedestrian friendly alternatives to remove single occupant vehicles. It is estimated that most of our trips are less than 5 miles.[1]

Behavioral changes can only be achieved in small increments, but those increments can be hastened by offering incentives, and thereby affecting change. Montgomery County already has many programs in place to remove vehicles from the roadways. Employees and residents need to be

Proposed Actions:

5.1 Initiate a contract for individual agencies to provide teleworking for its employees one or more days per week at a telework center.

5.2 A policy regarding telecommuting, teleworking at centers, compressed work week and flex-time should be set by the Department of Human Resources, supported by the County Council and County Executive, and its use encouraged.

5.3 Initiate preferential parking passes, guaranteed ride home privileges, and a parking cash out option for County employees.

5.4 Expand the County Employee ride free program on the Ride-On buses to the Metrorail system and WMATA. Investigate matching the federal stipend of $100 per month for transit fare subsidies for all County employees.

5.5 Lobby for increase service provided by the MARC train.

5.6 Provide an increase in Ride-On bus service, plan and implement dedicated bus lanes, and explore variable fares to increase ridership during off-peak hours.

5.7 Improve access for bicycles and pedestrians to facilitate travel to shopping, work/activity centers, and transit.

5.8 As part of the "Go Montgomery" transportation plan, it is recommended that the prioritization of initiatives take into account air quality benefits in selection of construction projects and that a local surcharge on vehicle registration fee address various vehicle emission rates.

5.9 Initiate a County recognition program where the Department that reduces the greatest VMT is recognized.

Proposed Progress Measures:

5.1 Commuter Services will report every other year on number of bike riders, carpoolers, vanpools, and businesses assisted in setting up programs in each Transportation Management District.

5.2 Division of Transit Services will report the number of riders utilizing all modes of mass transit.

5.3 Individual Departments will report the number of employees using compressed work week, alternative work hours, telecommuting, telework centers, carpooling, mass transit, and on the reduction of commute mileage.

5.4 Number of completed projects for bicycle and pedestrian access.

[1]U.S. Department of Transportation, 2001 National Travel Household Survey

[2]M-NCPPCTravel Forecasting for the Go Montgomery! Program

Strategy 6: Reduce Greenhouse Emissions "The Cities for Climate Protection Program"

Global warming and greenhouse gas emission reductions have been a "hotbed' of intense controversy. Lately though, even those contesting the need for greenhouse gas reductions are contending that there is scientific evidence to suggest that the earth is warming. In fact, the National Academy of Sciences reports the Earth's surface temperature has risen by about one degree Fahrenheit in the past century, with much of the warming occurring over the past 20 years. Evidence points to human activities, primarily our dependence on electricity generation by burning fossil fuels and dependence on the internal combustion engine in our vehicles, as the main culprits in altering the composition of the atmosphere, and subsequently, the buildup of greenhouse gases - primarily carbon dioxide, methane, and nitrous oxide. Greenhouse gases trap heat as the sun's energy is radiated back to the atmosphere, retaining heat somewhat like the glass panels of a greenhouse- the earth's blanket, so to speak.

The Environmental Protection Agency's global warming website reports that atmospheric concentrations of greenhouse gases have increased significantly since the Industrial Revolution began, with carbon dioxide concentrations rising 30%, methane concentrations more than doubling, and nitrous oxide concentrations rising nearly 15%. The additional concentrations of these greenhouse gases enhance the heat-trapping capability of the earth's atmosphere. Prior to the Industrial Revolution, human activity released very few gases into the atmosphere!

In order to reduce the generation of greenhouse gases produced in Montgomery County, the county passed a resolution in July 2000, to participate in the Cities for Climate Protection Campaign. The Cities for Climate Protection is a program that provides local governments with a framework for developing a strategy to reduce global warming and air pollution emissions. Five hundred local governments are participating in the campaign, representing 8 percent of global greenhouse gas emissions. Program participants receive software which provides local governments with the tools necessary for conducting an emission analysis, an evaluation of emissions reductions, measures local governments can choose, and a means to track actual emission reductions local governments achieve. Local governments participating in Cities for Climate Protection commit to the completion of five performance milestones:

1. Milestone 1: Conduct an energy and emissions inventory and forecast.
2. Milestone 2: Establish an emissions target.
3. Milestone 3: Develop and obtain approval for the local action plan.
4. Milestone 4: Implement policies and measures.
5. Milestone 5: Monitor and Verify results.

Climate Protection Initiative
Department of Environmental Protection
Montgomery County, Maryland

(For more information on Global Warming or to view The Cities for Climate Protection Resolution see Montgomery County Department of Environmental Protection's Air Quality Primer located at **www.AQPrimer.askdep.com***)*

Proposed Actions:

6.1 Complete Milestone 2 by formally, establishing a greenhouse gas emissions reduction target of 20% below 1990 (our selected baseline year) by the year 2010. (This also reflects the per capita energy reduction goal in the County Energy Policy.)

6.2 Develop a preliminary local action plan, outlining potential measures to implement to reduce greenhouse gas emissions to complete Milestones 3 and 4. Those potential measures shall include:

- Purchasing power from zero emission sources through the County's joint procurement effort. The goal will be 5 percent zero emission power, such as wind energy, from generation sources within sufficient geographic proximity to provide a local air quality benefit.
- Implementation of the Administrative Procedure 5-4 or an Energywise Office program to reduce energy consumption within County facilities.
- A goal for increasing the installed solar electric capacity within Montgomery County from the current 117 kilowatts to 234 kilowatts by 2010.
- Providing outreach and education to residents to encourage the use of clean and green energy.
- The expansion of public transit, encouragement of fuel efficient and alternative fueled vehicles, reducing vehicle miles traveled, and expanding the County's alternative fueled fleet by implementing Strategies 4 and 5.
- Providing outreach programs to reduce emissions from landscaping equipment, encouraging certain landscaping techniques, and promoting energy efficiency and energy conservation by implementing Strategy 8.

Proposed Progress Measures:

6.1 Percent reduction in greenhouse gas emissions. Prepare an annual report tracking the Greenhouse gas emission reductions. (Milestone 5)

[1]Cities for Climate Protection website, **www.iclei.org/co2/**

Strategy 7: Increase Tree Canopy and Forest Cover

Increasing tree canopy and forest cover can have a positive benefit on air quality. Normal processes of tree metabolism and growth include absorbing and filtering nitrogen dioxide, sulfur dioxide, ozone, carbon monoxide, and particulate matter less than 10 microns from the air. Trees remove carbon dioxide from the air and store carbon in their trunks and branches. Also, trees release oxygen and intercept dust. Their shade reduces summertime temperatures and they block winter winds.[1]

Trees in urban and suburban communities provide significant year-round energy savings. Winter windbreaks can lower heating costs by 10 to 20 percent. Summer shade can lower cooling costs by 15 to 35 percent. Every tree that we plant and maintain in our communities saves at least $20 in energy costs each year. When energy demands are reduced, less energy is produced and fewer pollutants are released into the air and water.

However, there have been reports concerning biogenic emissions of trees and the possibility of their contribution to ozone formation. During photosynthesis, plant metabolism, trees release secondary metabolic products. Some of these secondary metabolic products are biogenic volatile organic compounds (VOCs). Of special interest are the terpenes. The most volatile and reactive of the terpenes are isoprene and monoterpenes and these are of most concern relative to ozone formation. The emissions of the biogenic VOCs varies from tree species to tree species. For example, oaks, sweet gums, and pines are considered high emitters. Whereas, red maples, birch and the American Elm are considered low emitters of biogenic VOCs. In most instances, the air pollutant removal rates and indirect benefits, such as energy savings, from trees far outweigh biogenic VOC emissions.[2]

In light of the benefits that tree cover can provide, Montgomery County has adopted a Forest Preservation Strategy. The goals and objectives of the Forest Preservation Strategy include increasing the quantity and quality of trees, and restoring and protecting the natural forest ecosystems in Montgomery County.[3] Within the urban areas of the county, the emphasis is on increasing and maintaining the tree canopy. Tree canopy is the area of the crowns, or leafy parts, of trees.

American Forests has developed tree canopy coverage goals for urban and suburban areas. They are guidelines recommending the amount of land area that should be covered by tree canopies based on land use (see figure 7.1). The Department of Environmental Protection and the Interagency Forest Conservation Team support these tree canopy coverage goals.[4] These have been adopted as part of Montgomery County's Forest Preservation Strategy. County and state governments are responsible for maintaining street trees adjacent to public roads. National standards for street tree maintenance specify a five- to seven-year cycle for routine maintenance for every tree older than 30 to 40 years. Currently, in Montgomery County, this maintenance cycle is over 80 years. Trees and forests should be viewed as green infrastructure similarly to other urban infrastructure such as streets, sewer lines, buildings, and storm water management ponds. Like these

Basic Land Characteristics	Canopy Cover as a percent of land area
Suburban residential	50%
Urban residential	25%
Central business districts	15%
Overall	40%

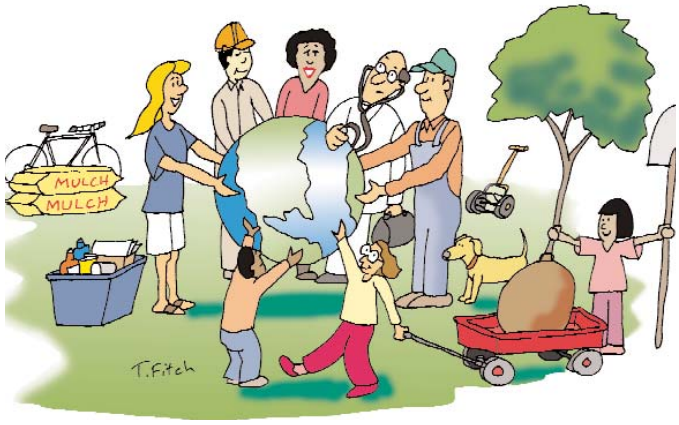
Figure 7.1. Tree canopy coverage goals for urban and suburban areas developed by American Forests.

Strategy 7, continued

facilities, trees and forests require long-term planning and care. Similarly, additional resources are needed to increase and nurture backyard trees, as well as forests.

Much of the forest land in Montgomery County is exposed to stresses related to overuse. Disturbance from trails and roads, clearing of overstory and understory plants, high populations of white-tailed deer, invasive plants, and other pests reduce the health and function of forest trees. The Forest Preservation Strategy outlines other measures to increase the number of acres of forests protected from development by easements, to increase the number of acres of new forests planted, and to address invasive and pest plant and animal species.

In addition to providing important air pollution reduction benefits, investments in trees and forests for air quality will have many other positive environmental effects. Forests are the single best land use for water quality protection. Trees and forests reduce storm water runoff, lower water temperatures, and provide food and shelter for aquatic and terrestrial creatures. Trees add value to our homes and communities, reduce noise, and



Proposed Actions:

7.1 Determine areas of County meeting urban and suburban tree canopy goals using the Ikonos imagery of tree canopy coverage.
7.2 Develop a tracking mechanism to monitor changes in tree canopy coverage.
7.3 Calculate and track changes in reductions of air pollutants in areas meeting tree canopy goals.
7.4 Calculate and track changes in energy and cost savings per acre in areas meeting tree canopy goals.
7.5 Plant street trees to replace dead or damaged ones removed each year with consideration given to climate, purpose, and emissions of biogenic VOCs.
7.6 Increase the number of acres of upland and riparian forests protected.

Proposed Progress Measures:

7.1 Percentage of County meeting urban and suburban tree canopy goals.
7.2 Percentage of developed areas with tree canopy tracking in place.
7.3 Pollutant reductions achieved in areas meeting tree canopy goals.
7.4 Energy and cost savings per acre in areas meeting tree canopy goals.
7.5 Ratio of dead or damaged street trees removed to trees replaced.
7.6 Acres of upland forest protected per year.
7.7 Acres of riparian forest protected per year.
7.8 Acres of riparian stream buffer reforested.

[1]American Forests, 2002.CITYgreen: Calculating the value of nature, 5.0 user manual. American Forests, Washington, DC.
[2]Trees & Our Air, January 1999, Galveston-Houston Association for Smog Prevention
[3]The Forest Preservation Strategy, October 2000, prepared by the Forest Preservation Task Force.
http://www.montgomerycountymd.gov/mc/services/dep/Forest/strategy.pdf.
[4]The Interagency Forest Conservation Team was formed as a result of the Forest Preservation Strategy.

Strategy 8: Reduce Emissions from Public Activities "Outreach Campaigns"

While industry is responsible for a large amount of the ozone precursors emitted in Maryland, the problem is as much caused by our actions: driving, lawn mowing, and painting, to name a few. Therefore, it is imperative that Montgomery County reach out to the public to encourage behavioral changes, thus addressing emissions where effective solutions to a significant portion of the air quality issues may be achieved. Some outreach activities in Montgomery County and other jurisdictions that have proven successful in the past are: Ozone Action Days, Cash for Clippers, and Cash for Junkers.

Our public outreach efforts need to concentrate on affecting the populations' behavior in order to have a positive air quality benefit. As we begin to analyze some of the major air quality issues addressed in the air strategy, we can see that many of the emissions can be positively affected through behavior changes such as lawn and garden emissions, energy conservation, and removing the single occupant vehicle.

Did you know?

Using your gasoline lawn mower for one hour emits as much ozone precursor emissions as driving your car from Baltimore to Boston.

This strategy aims to collectively address the emissions from these categories that have been identified throughout the strategies where the public's actions can make an impact.

For example, lawn and garden equipment is responsible for 24 percent of the total volatile organic compounds (VOCs) emitted in Montgomery County on a summer day. Pollution from these engines comes from by-products of the combustion process (exhaust) and, for gasoline-fueled engines, from evaporation of the fuel. Emission control for nonroad engines has not been a major design consideration until recently. Consequently, these engines are dirtier than highway vehicles, which have been subject to regulatory controls for over 20 years.[1]

Another activity shown to create air quality problems in this County where the public can be part of the solution is automobile emissions. An outreach program aimed at getting the older, more polluting vehicles off the road sooner, along with campaigns aimed at removing the single occupant vehicle, would provide a great air quality benefit.[2]

While, the previous outreach programs presented are aimed at receiving emission reductions earlier than anticipated by law, another positive air quality action the public can participate in is our Ozone Action Day outreach campaign. This campaign is aimed at changing people's behaviors in response to a report of an impending "Code Red" day. The media and news agencies have partnered in promoting actions that the public can take to reduce ozone precursor emissions on code red days. For example, Montgomery County Department of Environmental Protection recommends the public initiate the following actions on forecasted "Code Red" days: brown bag your lunch; take transit, carpool, bike, or telecommute; combine errands; avoid idling your car; make sure car is well tuned; do not mow your lawn; do not refuel your vehicle; substitute oil-based paints for water-based; and substitute aerosol and other household products that contain solvents, with non-solvent based products. Additionally, Montgomery County has implemented an "Ozone Action Days" program to reduce ozone precursor emissions from County Department activities on code red forecasted days.

Other behavioral based programs addressed in the air strategy include energy conservation measures. As detailed in strategies 3 and 6, there are numerous air quality issues associated with power plants, therefore outreach campaigns relating to energy conservation measures will have a positive impact on air quality.

(For more information on National Ambient Air Quality Standards, Ozone, Lawn and Garden Equipment, or Transportation see Montgomery County Department of Environmental Protection's Air Quality Primer at **www.AQPrimer.askdep.com***)*

Proposed Actions:

8.1 Initiate a yearly outreach program to keep citizens aware of their impact and beneficial behavior changes. The outreach program should address an air pollution concern.

8.2 In conjunction with strategies 3 and 6, outreach materials for energy conservation issues will be formulated along with residential green power purchasing.

8.3 In cooperation with Montgomery County Commuter Services, provide outreach materials for mass transit, fareshare, carpooling, and telework/telecommuting.

8.4 Continue the Department of Environmental Protection's "Ozone Action Days" plan, consider other actions to incorporate, and encourage other municipalities to adopt similar ozone action day actions in the form of an emission reduction pledge (A draft is provided in Appendix A).

8.5 Develop an elementary school based "air pollution" lesson plan.

Proposed Progress Measures:

8.1 Amount of VOCs reduced through the outreach efforts.

8.2 Amount of NOx reduced through the outreach efforts.

[1]The Environmental Protection Agency's website, **www.epa.gov**

[2]The Cookbook for Cleaner Air, Clean Air Act Advisory Committee, 1998

Appendix A: Draft Emission Reduction Pledge

Emission Reduction Pledge

The Montgomery County Maryland Emission Reduction Pledge is a voluntary pledge with local municipalities and agencies located in Montgomery County.

This pledge seeks to reduce the environmental impact of vehicle emissions and ozone precursor emissions from municipal operations located in Montgomery County.

Fleet Emmission Reduction Pledge

Montgomery County, Maryland and _____(city/town/agency) recognize that the emissions associated with the operation of its motor vehicle fleets exacerbates local air quality problems and results in greenhouse gas emissions that contribute to global climate change.

Montgomery County, Maryland and _____(city/town/agency) recognize that its Departments have a significant role to play in improving local air quality and reducing greenhouse gas emissions by reducing emissions from fleet operations and improving the energy efficiency of its fleets.

With this pledge, _____(city/town) joins Montgomery County's efforts to reduce emissions associated with its vehicle fleet.

_____(city/town)is making a commitment to:

1. Conduct a fleet inventory to include at least: (1) number of vehicles classified by the model year, make, model, and drivetrain type (2-wheel drive or 4-wheel drive), and the rated vehicle weight and classification (light-duty, medium-duty, heavy-duty); (2) estimate miles per gallon per vehicle; (3) annual miles driven per vehicle; (4) estimate total fuel (or power) consumption per vehicle; and (5) estimated emissions per mile for each pollutant by vehicle type/class based on EPA tailpipe standards for the following: Carbon Monoxide (CO), Nitrogen Oxides (NOx), Particulate Matter (PM), and Carbon Dioxide (CO2).

2. Reduce nitrogen oxide (NOx) fleet emissions the amount of _____(at least 10%) percent within two years of conducting a fleet emissions inventory.

3. Reduce hydrocarbon (HC) fleet emissions the amount of _____percent within two years of conducting a fleet emission inventory.

Ozone Action Day Program Adoption

Montgomery County, Maryland and _____(city/town/agency) recognize that the emissions associated with the daily activities of its operation exacerbates local air quality problems.

Montgomery County, Maryland and _____(city/town/agency) recognize that its Departments have a significant role to play in improving local air quality.

With this pledge, _____(city/town/agency) joins Montgomery County's efforts to reduce ozone precursor emissions on forecasted code red air quality days, by implementing an "Ozone Action Day Program" to include one or more of the following actions:

___1. Curtail paint striping on forecasted days.

___2. Curtail lawn mowing activities.

___3. Curtailment of median strip herbicide application.

___4. Asphalt paving curtailment.

___5. Refueling of fleet after 7pm.

_____ _____

Signature of Authorized City/Town Official) Date

Signature of Authorized Montgomery County Official) Date

Glossary of Acronyms

Acronyms

CFCs- Chloroflurocarbons
CH_4- Methane
CNG- Compressed Natural Gas
CO- Carbon Monoxide
COG- Metropolitan Washington Council of Governments
EPA- Environmental Protection Agency
GIS- Geographic Information System
HC- Hydrocarbon
HEV- Hybrid Electric Vehicle
ICLEI- International Council for Local Environmental Initiatives
LEED- Leadership in Energy and Environmental Design
NAAQS- National Ambient Air Quality Standards
NSR- New Source Review
NO_2- Nitrogen Dioxide
NOx- Nitrogen Oxides
O_3- Ozone
PAMS- Photochemical Assessment Monitoring Stations
Pb- Lead
PM- Particulate Matter
PM_{10}- Particulate Matter whose diameter is greater than 2.5 microns but less than 10 microns-"coarse particulate matter"
$PM_{2.5}$- Particulate Matter whose diameter is less than 2.5 microns-"fine particulate matter"
SCR- Selective Catalytic Reduction
SLAMS- State and Local Air Monitoring Stations
SO_2- Sulfur Dioxide
SOx- Sulfur Oxides
SUV- Sport Utility Vehicle
TMD- Transportation Management District
UV- Ultraviolet
VOCs- Volatile Organic Compounds
WMATA- Washington Metropolitan Area Transit Authority

Collaborating Agencies and Credits:

The Montgomery County Air Quality Strategy document was prepared by Montgomery County Department of Environmental Protection's Senior Air Quality Planner, Mary Richmond at the request of the Director, James Caldwell.

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DEP Mission Statement:

To protect and enhance the quality of life in our community through conservation, preservation and restoration of our environment guided by principles of science, resource management, sustainability and stewardship.

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We've got answers!

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